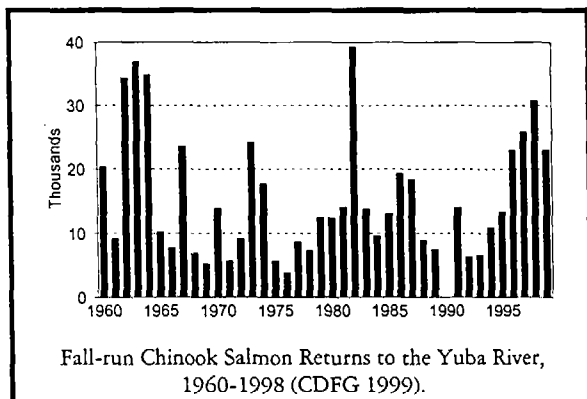


Presently, fall-run chinook salmon spawning runs average 13,050 fish annually.



Historically, there has been a small spring-run chinook salmon spawning population in the Yuba River. The run had almost disappeared by 1959, presumably because of diversions and hydraulic development projects. A remnant of the spring-run chinook salmon population persists in the lower Yuba River. It is maintained by fish produced in the river, salmon straying from the Feather River, and infrequent stocking of hatchery-reared fish by DFG (a practice that has been discontinued).

The lower Yuba River supports a seasonal American shad sport fishery from late April to July. The fishery is confined to the area between Daguerre Point Dam and its confluence with the Feather River. Studies have shown that the shad fishery on the Yuba River has declined significantly in the past two decades. The run was estimated at 30,000 to 40,000 spawning adults in 1968 and 40,000 adults in 1969. In recent years, however, the shad run has been only a fraction of that level. Daguerre Point Dam limits the upstream migration of American shad. The dam is equipped with two conventional pool-and-weir-type fishways. Shad do not generally enter fish ladders; therefore, most of the population is restricted to the river sections below the dam. Reduced flows below Daguerre Point Dam, particularly in spring and early summer, are a primary factor in the decline of the American shad run.

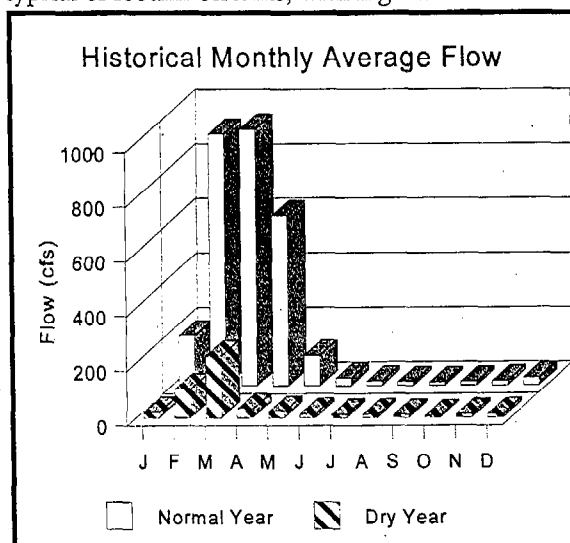
The three most significant diversions along the lower Yuba River are at or just upstream of Daguerre Point Dam. Water is generally extracted from late March through October. Hallwood Irrigation Company, Cordua Irrigation District, and Ramirez Water District share one diversion; the Brophy and South

Yuba Water Districts share another; and Browns Valley Irrigation District operates a third. The combined diversions can reach a maximum of 1,085 cfs (see table below). Juvenile chinook salmon, and likely juvenile steelhead, are lost at all diversion intake structures because of impingement on screens, entrainment into unscreened diversions, or predation in the river adjacent to the intakes. Although losses at individual diversions may not be significant, the cumulative impact of all diversion-related losses may be substantial. DFG estimated that before 1970, approximately 200 steelhead trout spawned in the river annually, and the potential existed for about 2,000 spawning adults after completing New Bullards Bar Reservoir.

## BEAR RIVER AND HONCUT CREEK ECOLOGICAL MANAGEMENT UNIT

The Bear River is the second largest tributary to the Feather River, with a watershed area of 300 square miles. It enters the Feather River at river mile (RM) 12, immediately upstream from the town of Nicolaus. Honcut Creek flows into the Feather River from a small foothill watershed approximately 15 miles below Thermalito. In highest rainfall years, winter flows average 3,400 to 5,600 cfs. In normal years, winter inflows are 600 to 800 cfs. In the driest years, watershed inflows average only 20 to 65 cfs in winter months and 0 cfs in all other months.

The natural or unimpaired Bear River flow pattern is typical of foothill streams, with high winter and



Historical Streamflow on the Bear River near Wheatland, 1962-1992 (Dry year is the 20th percentile year; normal year is the 50th percentile or median year)

Table 8. Diversion Rates in Acre-Feet per Month for the Major Water Districts Supplied by the Yuba County Water Agency on the Lower Yuba River

	Hallwood Irrigation Company	Corda Irrigation District		Ramirez Water District	Browns Valley Irrigation District		Brophy Water District	South Yuba Water District
Month	WR	WR	P	WR	WR	P	P	P
March	0	0	0	0	0	0	520	300
April	10,000	4,500	900	2,010	2,269	1,667	4,795	3,000
May	14,500	10,600	2,120	3,270	2,345	1,666	6,460	4,000
June	14,100	10,400	2,080	2,745	2,269	1,667	6,670	4,200
July	13,600	11,100	2,620	1,920	2,345	2,500	6,985	4,400
August	12,900	11,000	2,600	1,755	2,345	2,000	5,525	3,400
September	8,000	5,900	1,180	1,500	2,269	0	3,750	2,400
October	4,900	6,500	500	700	2,345	0	625	400
Total	78,000	60,000	12,000	13,900	16,187	9,500	35,330	22,100
Maximum cfs	275	--	275	75	38.2	42	230	150

Notes: WR = basic water right of water district.  
P = purchase water through contract with Yuba County Water Agency.

spring flows and very low summer and fall flows in wet years. Summer and early-fall inflows remain near 0 cfs in dry and normal years. Honcut Creek has a similar unimpaired flow pattern that includes low annual flow in dry years and very low summer and fall flows in most years.

Bear River flows are almost entirely regulated by several storage reservoirs and numerous diversions. Camp Far West is the largest storage reservoir, followed by Rollins Reservoir in the upper watershed near Grass Valley and Auburn. The South Sutter Irrigation District (SSID) Diversion Dam is the largest diversion. Minimum flow releases below the diversion into the Bear River are 25 cfs in spring and 10 cfs during the rest of the year. Flows from June through December are generally 0 to 40 cfs except in the wettest years. Flows in years of high rainfall are similar to unimpaired flows from fall to spring, averaging 3,500 to 5,200 cfs in winter; summer flows are 30 to 50 cfs, compared to unimpaired flows of 70 to 150 cfs.

The upstream anadromous fish limit is the SSID Diversion Dam, approximately 15 miles above the Feather River confluence. The Bear River once

supported substantial salmon and steelhead runs, but because of low flows in the lower river below the SSID Diversion Dam, no self-sustaining salmon runs presently exist, and the status of steelhead is unknown. Occasionally, when heavy fall rains and sufficient spillage take place at the SSID Diversion Dam, hundreds of fall-run chinook salmon and steelhead may ascend and spawn in the lower Bear River. In addition to the effects of Camp Far West Reservoir and the SSID diversion, other factors have contributed to streamflow problems in Bear River. These include numerous small water diversions and hydroelectric projects in the lower and upper watersheds. Agencies involved in these projects are the Nevada Irrigation District, Pacific Gas and Electric Company, Placer County Water Agency, and SSID. Portions of the water supply go to Auburn and Grass Valley. The proposed Garden Bar project, which would capture more of the winter streamflow for water supply, is currently inactive.

The major attribute of the Honcut Creek is its linkage to the District 10 area immediately north of Marysville. This area encompasses thousands of acres of private wetlands and flooded rice fields which

provide important wintering and foraging habitat for waterfowl.

The Bear River and Honcut Creek Ecological Management Units are presently less ecologically important for anadromous fish species than the other units in this Ecological Management Zone because of the extensive water development and inadequate natural summer and fall base flows. In some years, these streams provide habitat for fall-run chinook salmon, steelhead, and resident native fish populations. The overall ecological health of the Bear River and Honcut Creek Ecological Management Units, however, is poor.

### **SUTTER BASIN ECOLOGICAL MANAGEMENT UNIT**

The Sutter Bypass section of the Sutter Basin provides important waterfowl habitat and serves as a migratory route for salmon and steelhead in the upper Sacramento River and its tributaries, particularly Butte Creek. Salmon and steelhead migrating to Butte Creek use Butte Slough, which originates at the Butte Slough Outfall Gates and ends at the north end of the Sutter Bypass. The reach within the Sutter Bypass is generally referred to as the East and West Barrows and the connection with the Sacramento River is the Sacramento Slough. In wet years, when Sacramento River overflows into the bypass, both upstream-migrating adults and downstream-migrating juvenile salmon and steelhead use Butte Slough, the East and West Barrows, and Sacramento Slough. Native resident fish, including splittail, also use the bypass as spawning and rearing habitat. In wet years, some salmon, steelhead, and native resident fish may become stranded in isolated pockets and die when floodwaters recede from the bypass and respective overflow weirs (Tisdale, Colusa, and Moulton).

Sutter Bypass is also an important area for waterfowl and wildlife. The bypass has remnant riparian woodlands and wetlands and is part of the Sutter National Wildlife Refuge. Sutter Refuge is the only publicly owned waterfowl habitat in the Sutter basin. It consists of 2,590 acres of seasonally and permanently flood marsh and scattered uplands. Private duck clubs provide an 1,500 acres of habitat of which about 500 acres are natural wetland. Most of the private duck clubs and nearly all of the natural wetlands in this area are located in the Sutter Bypass

(Central Valley Habitat Joint Venture 1990). The northern end of the bypass is connected to the extensive marshlands of Butte Sink. Large areas of the bypass are used to grow irrigated crops, such as rice.

### **VISION FOR THE ECOLOGICAL MANAGEMENT ZONE**

The vision for the Feather River/Sutter Basin Ecological Management Zone includes restoring and enhancing important fishery, wildlife, and plant communities by restoring ecological processes and habitats and reducing stressors. Attaining this vision requires restoring or reactivating important ecological processes that create and maintain fish, wildlife, and plant community habitats throughout the Ecological Management Zone.

The vision for this Ecological Management Zone focuses on maintaining and improving floodplain and flood processes, streamflow, coarse sediment recruitment and transport, and seasonally flooded aquatic habitats that provide important wintering areas for waterfowl and shorebird guilds. Actions to reduce stressors include the installation of screen on diversions, upgrading or installing fish passage facilities at diversion dams or other obstacles to fish migration, providing suitable water temperatures for summer rearing, reducing the extent of stranding loss of juvenile fish, and limiting the adverse effects of introducing hatchery fish on endemic aquatic species.

Hatcheries in this and adjacent Ecological Management Zones will be operated to preserve the genetic identity of endemic, naturally spawning chinook salmon and steelhead trout stocks. Hatchery-produced fish will be used to support sustainable ocean recreational and commercial fisheries and directed fisheries in the natal streams. Marking techniques will enable sport and commercial anglers to distinguish between hatchery-produced and naturally produced fish. Additional genetic analyses of the Feather River and Yuba River spring-run chinook populations are necessary to determine the value and role of these stocks in efforts to rebuild Feather River and other basin populations. In addition, the hatcheries may play an extremely important role in the propagation of genetically pure, wild spring-run chinook salmon and steelhead. These

fish would be used to reestablish populations in areas that formerly supported the species.

Green sturgeon and white sturgeon use the Feather River for spawning, but additional studies are needed to identify and describe the species' habitat requirements and status in this basin. The Feather River could contribute more substantially to the overall sturgeon health and abundance if the species' life history and habitat requirements were known and habitat conditions maintained to benefit sturgeon along with other important species. Splittail would benefit from improvements in riparian and stream meander corridors, wetlands with connection to the rivers, and floodplain overflow basins and flood bypasses.

## **VISIONS FOR ECOLOGICAL MANAGEMENT UNITS**

### **FEATHER RIVER ECOLOGICAL MANAGEMENT UNIT**

The vision for the Feather River Ecological Management Unit is to improve natural spawning populations of spring- and fall-run chinook salmon and steelhead. This involves improving spring (March) flows below Oroville in dry and normal water-years, improving spring through fall base flows, providing suitable water temperatures for summer rearing, and improving spawning and rearing habitat in the lower river below Oroville. The vision also includes implementation of adaptive management components of monitoring and research to collect the scientific information required to best judge the merits of additional flows and the timing for additional flows that would provide the highest benefit for aquatic species and habitat maintenance.

The vision for the Feather River includes reactivating or maintaining important ecological processes that create and sustain habitats for anadromous fish. The Feather River must not only contribute substantially to the growth of many fish populations, but provide better support for naturally spawning steelhead, fall- and spring-run chinook salmon, American shad, white sturgeon and green sturgeon, lamprey, and striped bass. The most important processes include floodplain and flood processes and a natural streamflow pattern in the river, to which most of the anadromous and resident native fishes are adapted.

Higher, more natural spring flow events may encourage spring-run chinook salmon, steelhead, sturgeon, American shad, and striped bass move upstream into the Feather River during their traditional migrations in spring. Higher flows may also benefit juvenile fall-run chinook salmon migrating downstream and juvenile salmon migrating out of lower Feather River tributaries. These flows will also benefit stream-channel and riparian vegetation in the lower river and, consequently, will benefit fish. Improved riparian habitat will also benefit riparian-associated wildlife, such as those in the neotropical migratory bird guild. The added flows coming from the Feather River will also benefit juvenile salmon and steelhead from other Feather and Sacramento River tributaries in their journey through the lower Sacramento River below the Feather River and through the Delta and Bay.

Improving habitat in the lower Feather River will encourage natural production of these anadromous fish. Improving spawning habitat will increase young salmon and steelhead production. Restoring or maintaining stream-channel and riparian vegetation and reducing the extent of juvenile fish stranding will increase the survival and production of juvenile salmon and steelhead. Providing suitable water temperatures for summer rearing by managing cold water releases from Lake Oroville will significantly improve natural steelhead production.

### **YUBA RIVER ECOLOGICAL MANAGEMENT UNIT**

The vision for the Yuba River is to improve spring streamflows for spawning runs of spring-run chinook salmon (potentially), steelhead, sturgeon, and American shad. These flows will also benefit downstream migration of juvenile fall-run chinook salmon, steelhead, and sturgeon. Improving streamflows will also benefit stream-channel and riparian habitat; native resident species, including splittail, that spawn farther downstream in the Feather River; and other species that reside further downstream in the Bay-Delta estuary. The vision also includes evaluation of gravel recruitment and sediment transport processes, stream-channel configuration, and riparian habitats in the lower Yuba River floodplain to improve anadromous and resident fish production and survival.

At present, sufficient stored water remains in the Yuba River system (in New Bullards Bar Reservoir) to help restore and maintain the river's anadromous fish runs. Providing the needed streamflow, temperature, and screens for the lower Yuba River will affect storage in the reservoir and require operation changes at diversions in the lower river. An early spring flow event in the lower river during dry and normal water years will improve upstream passage for spring-run chinook salmon, and improve spawning conditions for steelhead, sturgeon, and American shad. Such a flow event would also improve downstream migration conditions for juvenile fall-run chinook salmon, steelhead, and sturgeon. The higher flows will also improve natural stream-channel and riparian habitat conditions in the lower river, consequently benefitting fish as well as a variety of other aquatic and terrestrial wildlife species. Reducing mortality at diversions and improving stream-channel and riparian habitat will also improve fish production. Restoring or maintaining riparian habitat will provide substantial benefits to riparian-associated wildlife species in the neotropical migratory bird guild.

High water temperatures in late spring, summer, and fall in the lower river can be improved by constructing a multiple-level outlet on Englebright Dam. Water temperature control will also be improved by maintaining the stream channel configuration and riparian vegetation of the lower river. A channel with more diversity, including islands, backwaters, and shaded riverine aquatic habitat, will reduce river heating and provide cool-water refuges for juvenile fish. Reducing the number of ponds linked to the lower river (e.g., in the Yuba Goldfields) will reduce the input of warmer water. Encouraging the flow of cool groundwater from the Goldfields through small stream channels lined with riparian vegetation may not only reduce heating, but also provide cool-water refuges for juvenile steelhead. The potential benefits of constructing exclusionary devices to prevent adult chinook salmon and steelhead from entering the Goldfields should be evaluated.

Gravel sources will be protected and the natural supply supplemented where and when necessary. Existing and past gravel mining operations in the stream channel, which affect the natural fluvial sorting and cleansing of gravel and inhibit gravel

recruitment downstream, will be changed to limit their effects.

Stream-channel and riparian habitat will be improved by promoting conservation of the lower river meander zone and active floodplain, rapidly phasing out gravel mining in the floodplain, and protecting shorelines and levee riparian vegetation from any damaging activities. Vegetation may need to be planted or the disturbed channel and floodplain regraded in certain areas to hasten and sustain recovery. Major efforts will be required to control or eradicate tamarisk and giant reed infestations, which prevent natural vegetation succession by native tree species. Improving the stream-channel configuration, such as shaded side channels and backwater areas that are heavily influenced by cool groundwater, will increase available spawning and rearing habitat and improve juvenile salmon and steelhead production in the lower river. Improving woody and other cover types in and along the stream margin will also increase juvenile salmon and steelhead production.

Steelhead and spring-run chinook salmon may greatly benefit from actions to restore access to historical holding, spawning and rearing areas upstream of Englebright Dam. Evaluations are needed on the extent and quality of habitat above Englebright Dam, the nature and quantity of sediments in the reservoir, the presence of any chemical contaminants in the sediments, and short- and long-term economic impacts. These evaluations are required so that decisions can be formulated regarding the efficacy of restoring fish access to stream reaches above Englebright Dam and are an integral element of the CALFED adaptive management approach to ecosystem restoration.

Stressors, such as unscreened diversions, fish passage problems, and illegal and legal harvest, should be reduced to improve health of salmon and steelhead populations. A cooperative will be developed program to evaluate the feasibility of screening irrigation diversions along the lower Yuba River. Upstream and downstream fish passage at Daguerre Point Dam should be improved and entrainment of juvenile steelhead into the diversion should be eliminate.

Measures being considered to reduce harvest of naturally produced chinook salmon in sport and commercial fisheries include restricting harvest and

marking all hatchery-produced fish to permit selective harvesting of hatchery fish. Enforcement and public education measures will be undertaken to ensure that harvest rates for salmon and steelhead are minimal. The current practice of stocking spring- and fall-run chinook salmon and steelhead using fish reared in the Feather River Hatchery should be reconsidered. The ramifications of this practice for wild stocks in the Feather River and adjacent Central Valley watersheds require careful consideration. Efforts to evaluate the genetic integrity of spring-run chinook salmon stocks in the Feather River will be expanded to include fall-run chinook salmon and steelhead. Criteria used to select genetic types of adult salmon and steelhead for the hatchery will be carefully evaluated to minimize possibly damaging effects on the genetic integrity of wild populations in the Central Valley.

### **BEAR RIVER AND HONCUT CREEK ECOLOGICAL MANAGEMENT UNITS**

The vision for the Bear River and Honcut Creek Ecological Management Units is to improve conditions for fall-run chinook salmon and steelhead by maintaining and improving stream-channel, riparian, and floodplain habitat; ensuring adequate spawning gravels; and, where possible, improving late-fall flows for adult salmon spawning migrations and late-winter flows to support young salmon emigrating from the river. In addition, improving gravel recruitment and riparian habitat would provide adequate habitat for salmon and steelhead in years when they use these streams. In addition to improving floodplain habitats, upper watershed health should be improved by reducing forest fuels and implementing other practices to protect streamflows, stream channels, and riparian habitat and minimize sediment input to the streams.

### **SUTTER BYPASS ECOLOGICAL MANAGEMENT UNIT**

The vision for the Sutter Bypass Ecological Management Unit is to restore adequate streamflows, as well as stream channel, riparian, and wetland habitats in the floodplain, and to ensure passage of adult salmon migrating upstream through the Sutter Bypass and accessibility to floodplain spawning and rearing areas for splittail. In addition to improving conditions for migrating salmon and steelhead in the Sutter Bypass and eliminating stranding, actions

taken to benefit salmon and steelhead will improve waterfowl and wildlife habitat in the bypass. Fish passage and unscreened diversion problems should be resolved where possible.

## **VISIONS FOR ECOLOGICAL PROCESSES**

### **CENTRAL VALLEY STREAMFLOWS:**

Streamflows shape stream channels. Riparian vegetation, provides habitat for fish, moderates water temperature in rivers, attracts anadromous fish to spawning streams, and transports young anadromous fish to downstream nursery areas in the Sacramento River, Bay-Delta estuary, and ocean. Streamflow in each of these rivers is impaired by upstream storage reservoirs and diversions, particularly in dry and normal rainfall years. A healthy streamflow pattern in the rivers and in the Sutter Bypass would emulate (imitate) the natural runoff pattern, with a late-winter/early-spring flow event and summer-fall base flows that maintain important ecological processes, functions, habitats, and important species. The vision for streamflows is to evaluate the ecological benefits of a short-term (10-day) flow event in late winter or early spring that typically occurred at least once in dry and normal years prior to water supply development on the rivers.

### **COARSE SEDIMENT SUPPLY:**

Gravel recruitment from basin watersheds is important to provide a natural stream channel configuration and stream substrate, as well as essential spawning gravels for salmon and steelhead. A natural sediment supply is also important to natural stream meander and to riparian habitat regeneration. Sediment transport and gravel recruitment has been eliminated below major dams in zone rivers. The vision is to supplement the gravel supply below major dams on the three rivers where needed for salmon and steelhead spawning habitat, riparian habitat, and natural stream channel and meander development.

**STREAM MEANDER:** In their floodplains, Central Valley rivers naturally meander through floodplain sediments, progressively eroding the next bank while adding to the previous bank. This process, called a stream meander, occurred in the stream corridors of the Feather, Yuba, and Bear Rivers. A natural stream meander process in the lower Feather, Yuba, and Bear River floodplains provides much of the habitat needed to support healthy riparian systems, wildlife,

and aquatic species. Today, the natural meander process in each stream is inhibited by dams, bank protection, bridge abutments, flood control levees, and the reduction or elimination of natural coarse sediments now trapped behind the large dams. In some places, bank erosion occurs, but lack of sediment precludes adding to the previous banks. The vision is to restore a portion of the natural meander to the rivers by setting back levees where they are necessary and by removing structures from the floodplain where possible.

**NATURAL FLOODPLAIN AND FLOOD PROCESSES:** The Sacramento Valley formerly had many natural overflow basins that retained floodwaters, permitted sediment deposition, and provided fish and waterfowl habitat. Partially reactivating these important ecological functions will contribute to system health and provide for prolonged periods of natural streamflow and sediment input. Natural overflow basins would also supply important habitat for fish, including chinook salmon and splittail, as well as nesting and foraging habitat for many waterfowl. The vision is to restore natural overflow basins within the lower floodplains of the four rivers and Sutter Basin. This would provide additional flood control protection for other areas in this zone and downstream, as well as valuable natural wetland, riparian, and aquatic habitats for fish and wildlife.

**CENTRAL VALLEY STREAM TEMPERATURES:** Salmon and steelhead depend on cool water for their survival. In the Feather, Yuba, and Bear Rivers, salmon and steelhead are confined to the floodplains below the dams. Maintaining cool water below the dams is essential to maintaining salmon and steelhead in these rivers. Summer and early fall water temperatures in floodplains of these rivers are naturally warm, but are kept cool by cold-water releases from deeper bottom waters of the major reservoirs. The extent of cool water habitat below the dams depends on the amount of cold water released from the dams, the extent of shade along the river channels provided by riparian vegetation, and the amount of warm water discharge into the rivers from urban and agricultural drainage. Improving water temperatures below the major impoundments in this zone can contribute to ecological system health and promote sustainable fisheries. Steelhead and spring chinook particularly depend on cool summer water temperatures as they remain in the rivers through the

summer. High fall water temperatures in the lower rivers hinder upstream migrations of fall-run chinook salmon and steelhead. The vision for water temperatures in these rivers is to provide sufficient summer and early-fall base flows from the dams and restore the riparian corridors and natural stream channel characteristics that limit river heating. Maintaining sufficient cool water storage in the reservoirs in droughts will also be important to maintain a minimum of cool-water habitat in the rivers.

## VISIONS FOR HABITATS

**SEASONAL WETLAND HABITAT:** Seasonal flooding of leveed lands and flood bypasses provide important habitat for waterfowl, native fish, native plants, and wildlife. Flooding and draining seasonal wetlands also contributes to the aquatic foodweb. The vision is to increase the frequency and extent of over-bank flooding in the river floodplains and Sutter Basin.

**RIPARIAN AND RIVERINE AQUATIC HABITATS:** Riparian and shaded riverine aquatic habitats are important to the health of the rivers by providing shade, insects and organic debris important to the aquatic foodweb, and soil and bank protection. The riparian corridors and related riparian and shaded riverine aquatic habitats are impaired by lack of natural stream meander; river channel confinement by levees; and streamside vegetation loss to animal grazing, levee construction, and agricultural clearing. The vision is to improve and restore riparian habitat along the rivers and Sutter Bypass, where possible and needed.

**FRESHWATER FISH HABITAT:** Freshwater fish habitat is an important component needed to ensure the sustainability of resident native and anadromous fish species. The lower reaches of the Feather, Yuba, and Bear rivers are typical of fall chinook salmon spawning streams (Moyle and Ellison 1991). The quality of freshwater fish habitat in these streams will be maintained through actions directed at streamflows, coarse sediment supply, stream meander, natural floodplain and flood processes, and maintaining and restoring riparian and riverine aquatic habitats.

**ESSENTIAL FISH HABITAT:** The Feather, Yuba, and Bear rivers have been identified as Essential Fish

Habitat (EFH) based on the definition of waters currently or historically accessible to salmon (National Marine Fisheries Service 1998). Key features of EFH to maintain or restore in these rivers include substrate composition; water quality; water quantity, depth and velocity; channel gradient and stability; food; cover and habitat complexity; space; access and passage; and flood plain and habitat connectivity.

**AGRICULTURAL LANDS:** Improving habitats on and adjacent to agricultural lands in the Feather River/Sutter Basin Ecological Management Zone will benefit native waterfowl and wildlife species. Emphasizing certain agricultural practices (e.g., winter flooding and harvesting methods that leave some grain in the fields) will also benefit many wildlife that seasonally use these important habitats.

## VISIONS FOR REDUCING OR ELIMINATING STRESSORS

**WATER DIVERSIONS:** Water diversions along the rivers and Sutter Bypass divert not only water but small fish. Many diversions are screened to reduce young fish losses. Reducing losses to screened and unscreened diversions will contribute to overall ecosystem health by promoting sustainable fisheries and higher population levels. The vision is to screen those diversions presently with no screens or with inadequate screens that where there is a potential to screen young fish in significant numbers, and for diversions where the fish screens are not operated continually throughout the irrigation season, to extend the operation throughout the period of diversion.

**DAMS AND OTHER STRUCTURES:** Instream structures can impair up- and downstream adult and juvenile fish passage. The vision for the Feather River/Sutter Basin Ecological Management Zone is that the connections between upstream fish holding, spawning, and rearing areas and the Sacramento River are improved and maintained to permit unobstructed or unimpaired fish passage. Fish passage at Daguerre Point Dam on the Yuba River needs to be improved to permit easier up and downstream passage for steelhead and chinook salmon. The vision also includes evaluating the potential of restoring access to historical habitats presently blocked by impassable dams.

**HARVEST OF FISH AND WILDLIFE:** The legal and illegal anadromous fish harvest in the river, estuary, and ocean constrains recovery of wild anadromous fish populations. Reducing the harvest would likely be necessary to allow recovery of wild populations to a healthy condition. The vision is to continue to take actions that will reduce the wild anadromous fish harvest and focus legal harvest on hatchery stocks of salmon and steelhead.

**ARTIFICIAL PROPAGATION OF FISH:** Stocking hatchery-reared salmon and steelhead in the Feather River supports important sport and commercial fisheries and helps to mitigate salmon and steelhead losses caused by large dams and reservoirs. Hatchery fish also supplement naturally spawning salmon and steelhead in the river. However, hatchery salmon and steelhead may impede the recovery of wild populations by competing with and preying on young wild fish and reducing the genetic integrity of the wild populations. The vision is to improve hatchery practices of adult fish selection, spawning, rearing, and release to minimize potential conflicts with naturally-spawning salmon and steelhead populations.

**STRANDING:** Biological and technical evaluations will be completed to fully assess the potential adverse effects of stranding and the resultant loss of juvenile chinook salmon. The vision is that stranding losses will be minimized such that stranding will not impair efforts to maintain self-sustaining populations of anadromous fish in the rivers and streams of this ecological management zone.

## VISIONS FOR SPECIES

**GREEN STURGEON:** The vision for green sturgeon is to recovery the California species of special concern by maintaining and restoring population distribution and abundance to historical levels. Green sturgeon are known to inhabit and possibly spawn in the Feather River. Improved flows and stream channel and floodplain processes will benefit sturgeon populations through improved habitat and food supply. Higher peak late winter and spring flows will provide attraction for adult sturgeon moving upstream from the lower rivers, Delta, Bay, and ocean. Stream channel improvements will provide greater amounts and improved quality of spawning and early rearing habitat. Screening unscreened diversions will reduce young sturgeon losses to water

diversions. Limiting the adult sturgeon harvest will also protect the populations.

**WHITE STURGEON:** The vision for white sturgeon is to maintain and restore population distribution and abundance to historical levels and support a sport fishery. White sturgeon are known to inhabit and possibly spawn in the lower Feather River. Improved flows and stream channel and floodplain processes will benefit sturgeon populations through improved habitat and food supply. Higher peak late winter and spring flows will provide attraction for adult sturgeon moving upstream from the lower rivers, Delta, Bay, and ocean. Stream channel improvements will provide greater amounts and improved quality of spawning and early rearing habitat. Screening unscreened diversions will reduce young sturgeon losses to water diversions. Limiting the adult sturgeon harvest will also protect the populations.

**CHINOOK SALMON:** The vision for chinook salmon is to recover all stocks presently listed or proposed for listing under ESA and CESA, achieve naturally spawning population levels that support and maintain ocean commercial and ocean and inland recreational fisheries. Spring- and fall-run chinook salmon will benefit from improved flows. Late-winter and spring flows will provide attraction for upstream migrating adult spring chinook and downstream migrating spring- and fall-run chinook. Summer and fall base flow improvements will benefit over-summering adult and juvenile spring-run chinook salmon, as well as upstream migrating fall-run chinook salmon. Improvements in wetland and riparian habitats; stream channel and meander; and coarse sediment recruitment will also improve spring- and fall-run chinook salmon spawning and rearing habitat. Screening unscreened and poorly screened diversions will improve young salmon production. Limiting harvest will help ensure adequate numbers of spawners.

**STEELHEAD:** The vision for steelhead trout is to recover this species listed as threatened under the ESA, and achieve naturally spawning populations of sufficient size to support inland recreational fishing and that use fully existing and restored habitat. Steelhead will benefit from improved peak flow events, especially in dry and normal years. Summer-fall base flows are needed to maintain over-summering juveniles and will also provide water temperatures low enough to allow juvenile steelhead

to survive. Steelhead will also benefit from improved gravel spawning habitat, and stream rearing habitat, especially if summer river heating is reduced in the process. Screening unscreened and poorly screened diversions will improve young steelhead production. Limiting harvest to hatchery steelhead will help to protect wild steelhead.

Steelhead in the Feather River are supported by a hatchery propagation program at Feather River Hatchery. The hatchery program will continue, but improved environmental conditions in the river, the Sacramento River, and Delta will allow for more reliance on the wild, naturally spawning population.

**GIANT GARTER SNAKE:** The vision for the giant garter snake is to contribute to the recovery of this State and federally listed threatened species in order to contribute to the overall species richness and diversity. Protecting existing and restoring additional suitable wetland and upland habitats will be critical to achieving recovery of the giant garter snake. The proposed restoration of aquatic, wetland, riparian, and upland habitats in the Feather River/Sutter Basin Ecological Management Zone will help in the recovery of this species by increasing habitat quality and area.

**STRIPED BASS:** The vision for striped bass is to maintain healthy populations, consistent with restoring native species, to their 1980s level of abundance to support a sport fishery in the Bay, Delta, and tributary rivers. Striped bass will indirectly benefit from larger late winter, early spring flow events provided in the lower Feather River to benefit chinook salmon and steelhead. The higher flow will provide upstream attraction flows and improve transport of eggs from spawning areas in the lower Feather and Sacramento Rivers.

**AMERICAN SHAD:** The vision for American shad is to maintain a naturally spawning population, consistent with restoring native species, that supports a sport fishery similar to the fishery that existed in the 1960s and 1970s. Improved spring flows should benefit American shad runs in the lower Feather and Yuba Rivers. Greater magnitude flow events in spring will provide attraction flows for adults to lower river spawning areas. Higher spring through fall base flows should improve spawning and early rearing, post-spawning adult survival, and juvenile shad survival and downstream migration. Although

American shad require warmer temperatures for spawning, stream temperatures will be driven by the requirements of native chinook salmon and steelhead.

**SPLITTAIL:** The vision for splittail is to recover this federally listed threatened species. Improvements in the riparian and stream meander corridors, wetlands, and floodplain overflow basins will improve spawning and early rearing habitat of splittail and other native resident fish species. Improved late winter and early spring flows will provide attraction flows for upstream migrating adult splittail from the Delta, and improve transport of larvae splittail downstream to the lower rivers and Bay-Delta.

**WATERFOWL:** The vision for waterfowl is to maintain and restore healthy populations at levels that can support consumptive (e.g., hunting) and nonconsumptive (e.g., birdwatching) uses, through protection and improvement of habitats and reduction in stressors. Waterfowl will benefit from improved riparian corridors, floodplain overflow basins, and more wetlands.

**PLANT SPECIES AND COMMUNITIES:** The vision for plant species and communities is to protect and restore these resources in conjunction with efforts to protect and restore wetland and riparian and riverine aquatic habitats.

## **INTEGRATION WITH OTHER RESTORATION PROGRAMS**

Maintaining and restoring the health of the Ecological Management Units in the Feather River/Sutter Basin Ecological Management Zone will depend on the efforts of local and State water management agencies. Efforts in the Sutter Basin will be linked to activities of the California Waterfowl Association, Ducks Unlimited, The Nature Conservancy, and the California Rice Industry. Overall, these efforts will require cooperation from resource agencies, such as DFG, the California Department of Water Resources (DWR), the U.S. Fish and Wildlife Service (USFWS), and the National Marine Fisheries Service, as well as participation and support from the U.S. Bureau of Reclamation (Reclamation), the U.S. Natural Resources Conservation Service (NRCS), and other private organizations, water districts, and landowners. These groups will work together to maintain and restore streamflows and fish and wildlife habitat, reduce

impacts of diversions, minimize poaching, and minimize habitat and water quality degradation in basin streams. Funding may be provided to enhance streamflows, reduce fish-passage problems, screen diversions, restore habitats, and increase California Fish and Game Code enforcement to protect recovering salmon and steelhead populations. The U.S. Army Corps of Engineers owns and operates the Daguerre Point Dam on the Yuba River and is undertaking evaluations to improve fish passage and fish screening opportunities.

## **CENTRAL VALLEY PROJECT IMPROVEMENT ACT**

Restoring and maintaining ecological processes and functions in the Feather/Sutter Ecological Management Zone will augment other important ongoing and future restoration efforts for the zone. The program proposed by the Central Valley Project Improvement Act (CVPIA) will complement efforts of the USFWS's Anadromous Fish Restoration Program (USFWS 1997). The goal of the program is to double the average anadromous fish population that was produced naturally in the system from 1967 through 1991.

## **SALMON, STEELHEAD TROUT AND ANADROMOUS FISHERIES PROGRAM ACT (SB 2261)**

The vision will also help the DFG to reach its goal, under this program, of doubling the number of anadromous fish that were produced in 1988.

## **CENTRAL VALLEY HABITAT JOINT VENTURE**

The Central Valley Habitat Joint Venture and the North American Waterfowl Management Plan have developed objectives for wetlands in the Butte Basin Ecological Management Zone. These objectives are consistent with the ERPP targets developed for this Ecological Management Zone.

## **UPPER YUBA RIVER STUDIES PROGRAM**

The Upper Yuba River Studies Program is a stakeholder driven process directed by the Upper Yuba River Workgroup. The agreed upon purpose of the Program is to determine if the introduction of wild chinook salmon and steelhead to the Upper